serially. The papillary bodies in the vicinity of the follicle were hypertrophied and the interpapillary vessels somewhat increased in size, but there were no signs of the presence of acute inflammation. There was some thickening of the prickle layer, but its relations were unchanged and no inflammatory or degenerative changes were noted. The follicle itself was slightly atrophied at the base, and the hair shaft considerably shrunken. Unfortunately the horny plug at the orifice had become detached at some time during the preparatory process, and its exact relation to the main body of the specimen was more or less a matter of conjecture. The mouth of the follicle was dilated, the walls meeting the hair shaft at a wide V-shaped angle. The corneous layer, which still adhered to the hypertrophied epidermis, was thicker than that usually found in a normal appendage. The contiguous sebaceous glands were much smaller than usual, with apparently some condensation of the surrounding connective tissue. None of the sections were stained for bacteria. From a general view-point the picture was that of a keratosis pilaris lesion which had existed for some time, and in which either as a result of suprafollicular pressure or intrafollicular changes, atrophic changes had occurred.

TREATMENT. A stimulating antiseptic lotion containing mercuric chloride, chloral hydrate, spirits of formic acid, castor oil, and alcohol, to be applied once daily, at bedtime, and an ointment containing salicylic acid and ammoniated mercury in rose water ointment, to be rubbed into the scalp once each week, were prescribed. The patient was instructed to wash the scalp thoroughly with warm soft water and green soap at intervals of a fortnight. The use of this combination promptly relieved the symptoms, but sufficient time has not elapsed to enable one to judge the permancy of the result.

SERODIAGNOSIS OF RABIES: PRELIMINARY REPORT.[1]

BY MICHAEL G. WOHL, M.D.,
PHILADELPHIA.

(From the Neuropathological Laboratory of the Medico-Chirurgical College, Philadelphia.)

THE early diagnosis of rabies has been the object of investigation of many an experimenter. Pasteur relied upon rabbit inoculation for diagnosis, but this meant fifteen to twenty days until the patient knew whether to get treatment or not. In some cases, according to Schauder, rabbits inoculated with street virus may develop hydrophobia two or three months after inoculation, especially is this true where it has been necessary to use emulsion of brain tissue in 1 per cent. phenol such as is the case with brains which have begun to decompose.

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[1] Read before the Pathological Society of Philadelphia, May 14, 1914.

Wilson, from the Research Laboratory of New York Department of Health, shortened the period to nine days by inoculating guinea-pigs. Schindler and Fermi have used mice and rats, yet the latter animals are not suitable for diagnostic purposes, for the inoculation period is too short, and hence it is rather difficult to observe upon these animals the development of the symptoms of rabies. The postmortem findings are neither characteristic nor sufficiently constant to warrant a diagnosis.

Thus the hyperemia of the cord and brain and miliary softenings or the leukocytic infiltration described by John and Dexler are likewise found in parenchymatous encephalomyelitis. Babe's rabic tubercles and degeneration of spinal nerve cells, which are accompanied by a disappearance of the chromatin substance, are not found in all cases of rabies so as to be sufficient for diagnosis.

The same holds true of Van Gehuchten's phenomenon, a disappearance of nerve cells and a proliferation of the endothelial capsule with a round-cell infiltration of the sympathetic and peripheral cerebrospinal ganglia.

The negri bodies, first described in 1903, which are found in rabies in the large nerve cells of the central nervous system, are considered today sufficient for diagnosis; yet they were not found before symptoms developed, although the central nervous system was infective at this time. Wilson claims that they are found in rabbits inoculated with street virus on the seventh day and with fixed virus on the fourth day. The complement fixation test tried by Conwall from the Pasteur Institute of Southern India was unsuccessful.

Professor Joseph McFarland, through a personal communication, informed me that he found the complement fixation test unreliable in the diagnosis of rabies, for the reaction proved positive with sera of healthy rabbits.

The discovery of a means of an early diagnosis of rabies is then a desideratum of great importance. It occurred to us that the principle of Abderhalden's serodiagnosis of pregnancy could be applied to rabies as well. As long as there is a virus present which is the causative agent of the disease, then, necessarily, it causes metabolic disturbances of cells with which the virus comes into contact, against these products "protective ferments" are elaborated which rid the body of these foreign elements. To detect these ferments in rabies was the object of our investigation.

At the time of the present writing our work is not completed, yet we feel that we have closed a chapter the records of which we wish to set forth in the present report.

Experiments. We used two series of rabbits.

Series 1. A batch of ten rabbits were inoculated subdurally with fixed virus by Dr. J. Reichel, from Glenolden, Pa., to whom we desire to express our thanks. Ten c.c. of blood were taken from the first rabbit before the inoculation. The same amount was taken from the rest of the rabbits on each successive day and from the first rabbit again on the seventh day. The blood was centrifuged for three minutes, and the serum, drawn off with a sterile, dry pipette, was used for our subsequent tests.

Rabbit.	Tissue used, brain.	Control.		Remarks.
		Serum.	Tissue + saline.	
No. 8269. January 12, 1914. Blood drawn before inoculation.	Faint violet.	—	—	The serum had a slightly reddish tinge.
No. 8270. January 13, 1914. First day after inoculation.	Moderate violet.	—	—	Symptoms on seventh day.
No. 8271. January 14, 1914. Second day.	Deep violet.	—	—	Serum had reddish tinge. Rabbit died four days after inoculation. Autopsy could not be held.
No. 8272. January 15, 1914. Third day.	Blue.	—	—	Placenta plus serum gave a light violet color. Symptoms on seventh day.
No. 8273. January 16, 1914. Fourth day.	Blue.	—	—	Symptoms on seventh day.
No. 8274. January 17, 1914. Fifth day.	Blood completely hemolyzed and dispensed with.			
No. 8275. January 18, 1914. Sixth day.	Blue.	—	—	Blood had red tinge. Rabbit died with symptoms of rabies on tenth day.
No. 8269. January 19, 1914. Seventh day.	Blue.	—	—	Showed symptoms on the same day.
No. 8277. January 19, 1914.	Blue.	—	—	Reddish tinge; symptoms on eighth day.

Brain tissue removed from a rabbit that died of rabies was used as our substrate for two reasons; (1) it was the tissue with which the virus came in contact first, hence if ferments were produced they would naturally cause cleavage of brain tissue first; (2) by using the brain tissue of a rabid rabbit we obtained practically a pure culture of the rabies virus, and if the ferments are specific they would act against the virus grown in the brain tissue of rabbits.

The brain tissue was thoroughly freed of blood. This was accomplished by removing the meninges and allowing water to run over the brain fifteen to twenty minutes. The bloodless tissue was coagulated in the way similar to that used for coagulation of placenta for the diagnosis of pregnancy, *i. e.*, boiled in successive changes of water (to the first boiling a few drops of acetic acid being added) until 10 c.c. from the last boiling with 1 c.c. of 1 per cent. ninhydrin gave a negative reaction. Our thimbles have been tritrated for impermeability of albumin and permeability of pepton and placed in dry beakers.

About 0.5 gm. of brain tissue was put into the thimble and 1.5 c.c. of the serum added. The outside of the thimble being washed off thoroughly; 20 c.c. of water were added to the beaker and distilled toluol to the contents of the thimble and to the beaker.

Controls with serum alone and with tissue plus normal saline were used.

The thimbles were placed into an incubator for sixteen hours and 10 c.c. of the diffusiate boiled for one minute with 0.2 c.c. of 1 per cent. ninhydrin.

The results were as recorded in the table on p. 429.

Series 2. Ten rabbits were inoculated as previously and serum, brain tissue, and spinal cord of a rabbit were prepared as above. Occasionally we used either tissue as indicated below. Results:

Rabbit.	Brain.	Spinal.	Control.		Remarks.
			Serum.	Tissue + saline.	
No. 8228. First day.	Moderate violet.	Faint violet.	—	—	Symptoms on seventh day.
No. 8229. Second day.	Deep violet.	Faint violet.	—	—	Placenta light violet; symptoms on seventh day.
No. 8230. Third day.	Blue.	Violet.	—	—	Rabbit died on fifth day.
No. 8231. Fourth day.	Blue.	Violet.	—	—	Thyroid moderate violet; symptoms on seventh day.
No. 8232. Fifth day.	Blue.	Blue.	—	—	
No. 8233. Seventh day.	...	...	—	—	Thyroid moderate violet. Adrenal moderate violet. Rabbit had symptoms on same day.
No. 8235.	Blood completely hemolyzed.				

No. A. Placenta violet; brain light violet: control rabbit.
No. B. Placenta violet; brain light violet; control rabbit.
No. C. Placenta violet; brain light violet; control rabbit.

From the results obtained in the first series we find that in rabies, brain tissue is broken up as early as the third day after inoculation if we take the blue color to indicate a positive reaction. The same result was obtained in our second series. The spinal cord was broken up on the fifth day. The blood from No. 8269 gave a faint violet color before inoculation. This was probably due to the hemolysis that occurred in this blood. The result obtained from this rabbit is very interesting. On January 19, 1914, *i. e.*, seven days after inoculation, the reaction was distinctly positive (deep blue).

In our first series placental tissue was broken up in one case; in the second series placental thyroid, adrenal, yet to a very light degree (violet).

The serum of the controls caused cleavage of brain and placental tissue to a light degree.

The distinct blue color obtained with serums from the rabid rabbits indicates that an additional ferment is produced, due to the virus of hydrophobia and upon the intensity of the reaction the diagnosis could be made.

SUMMARY. 1. The Abderhalden reaction might be utilized for diagnostic purposes of rabies.

2. The reaction is positive as early as the third day in rabbits subdurally inoculated with fixed virus.

3. Sera of healthy rabbits cause cleavage of brain and placenta tissue, yet to a very light degree.